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Bamboo: A sustainable and eco-friendly alternative

A case study of Madhya Pradesh State Bamboo Mission

Published: March 2022

Developed and Designed by Indev Consultancy

https://voisplanet.com

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_VO**IS Planet** portal primarily focuses on environmental sustainability covering various aspects: **Low carbon, Renewable energy usage** and **E-waste management.**

It is aimed at aggregating and helping co-create knowledge and information on environmentally responsive behaviours and concurrently pursuing result-oriented social media campaigns to encourage people and specifically the youth, to take proactive actions in promoting sustainable lifestyle and creating a positive impact on the environmental ecosystem in their surroundings

By: _VO**IS Planet**

Executive Summary

The Madhya Pradesh State Bamboo Mission (MPSBM) was registered as a society in July 2013 under MP Societies Registration Act, 1973. It was formulated to function as the coordinating organization for bamboo related activities in the state. **MPSBM** is engaged in a 30-year strategic plan, 15-year perspective plan and 3-year action plan to develop the bamboo sector to rejuvenate the state's bamboo forest(s), create infrastructure for pre and post- plantation activities, develop methodologies for best cultivation and harvesting practices, create a setup for bamboo treatment, primary processing units and storage of semi-finished bamboo products. Simultaneously MPSBM is helping to develop bamboo-based handicrafts as well as micro, small and medium-size bamboo enterprises. The mission involves skill development of traditional bamboo artisans of the state along with manufacturing of bamboo products and advanced technology of mechanized working with the development of advanced tools, equipment and machinery.

MPSBM is also instrumental in intensively managing the natural bamboo forest of the state, encouraging farmers to take up bamboo cultivation, developing mechanisms of bamboo marketing and up-gradation of existing various common facility centres (CFCs) of the state. The mission is committed to look at the entire bamboo Eco-system— the resources, producers, marketers, buyers, business development resource persons, and even the flora and fauna which are deeply dependent on bamboo forests. It is also working in a PPP model functioning in a balanced way while keeping a synergy among different stakeholders for bamboo-based development to flourish sustainably and holistically in MP.

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Introduction

We are all familiar with the imbalance in the global ecosystem on account of the constant rise in human induced activities that have pushed climate change towards a catastrophic state already.. Considering the consequences of these activities, the need of the hour is to take actions to mitigate the effects of climate change and simultaneously adopt measures that help in achieving the net-Zero target and sustainable development goals.

Bamboo, a versatile and renewable grass, has taken center stage in recent times. It is an ecologically, socially, economically and culturally sustainable material- offering solutions to sustainability-related issues, such as global warming, climate change, poverty, food security and job security as well

In a dedicated approach to mitigate these carbon emissions and achieve the global sustainable development goals, one of the key initiatives running in India is the Madhya Pradesh State Bamboo Mission.

MPSBM is dedicated to promoting and facilitating bamboo-based development in a holistically sustainable manner, to address multiple dimensions, including ecological, economic, social and cultural issues. The mission's approach is to map the entire bamboo production-to-consumption system—from cultivation and management of bamboo to harvesting, design, production and marketing. This is being done in an integrated manner, through a multi-departmental and multi-dimensional approach, alongside the capacity building of the stakeholders, research and development, and a massive awareness generation in Madhya Pradesh on the potential of the bamboo sector. (MP forest government, 2020, 7)

Background

Bamboo coverage and species in India

According to the report issued by the Forest Survey of India, there are a total of 125 indigenous and 11 exotic species of bamboo belonging to 23 genera found in India.

Owing to its diverse climatic conditions, India has a wide variety of Bamboo. The chart below shows the distribution of prevalent bamboo species found in different regions of the country.

States	Area (In million hectare)
Madhya Pradesh	2
Maharashtra	1.54
Arunachal Pradesh	1.49
Odisha	1.18
Chattisgarh	1.10

Bamboo bearing Indian states (Source: NITI/2020)

The production of bamboo from natural forests in MP is estimated at about 75,000NT. One NT on scale is equal to 2,400 meters, and the ratio of industrial to commercial (long) bamboo is roughly 65% to 35%. There is limited data available for bamboo production on private land. However, according to a rough estimate, about 20,000NT of commercial bamboo is being harvested from farmlands. (MPforest, n.d., 15)

One NT = 2,400 meters

Species/ States	Assam	Arunachal Pradesh	Meghalaya	Manipur	Mizoram	Nagaland	Tripura	Sikkim
Bambusabalcooa	+	+	+	-	-	+	+	+
B. bambos	+	+	+	+	+	+	+	
B. cacharensis	+	-	-	-	-	-	+	-
B. nutans	+	+	+	+	+	+	+	+
B. polymorpha	-	+	+	-	-	-	+	-
B. tulda	+	+	+	+	+	+	+	+
Dendrocalamus asper	+	-	-	-	-	-	-	+
D. hamiltonii	+	+	+	+	+	+	+	+
Melocannabaccifera	+	+	+	+	+	+	+	+
Thyrostachysoliveri	-	-	-	+	-	-	+	-
+ Available, - Not Available								

Different bamboo species found in India (Source: NITI/2021)

Why Bamboo?

Ecological benefits of bamboo

Role of Bamboo in carbon sequestration

Bamboo rapidly sequesters carbon in biomass and soil and can thrive on degraded lands and Long-lived bamboo products can also store carbon over time. As per the carbon sequestration calculations, including both living biomass and long-lived bamboo products, with an annual rate of 2.03 tons of carbon per hectare, resulting in a total of 8.3-21.3 gigatons of carbon dioxide sequestered by 2050. (Drawdown, n.d., 1)

Bamboo as a bio-fuel

There is an urgency to produce more renewable energy, to replace fossil fuels. Bamboo, a renewable lignocellulosic material and non-food biomass, has great potential to be utilized to be the energy of the future.

Several studies have shown that bamboo could potentially be used as a suitable fuel because it shares desirable fuel characteristics present in other woody biomass. Bamboo can be used as an energy source by converting it into solid, liquid, and gaseous fuels. However, to utilize bamboo as a high promise energy crop resource for biofuels, a secure and stable supply is required.

Eco-friendly alternative to mitigate plastic pollution

Bamboo can provide a solution to one of the major environmental challenges of plastic pollution.

On a global scale, long-lasting bamboo products such as construction materials, flooring panels, household products & handicrafts can help in keeping bamboo's global negative carbon footprint if the products, when not any more fulfilling their designed function, are appropriately recycled or transformed.

Bamboo can substitute the wood demand & promote livelihood

Bamboo products

Modern technologies allow the use of bamboo as a durable and high-quality wood substitute. Premium products such as bamboo flooring, laminated furniture, mat boards, strand lumber, etc. have huge international demand with big pro-poor financial impact and employment potential. Bamboo productsThe Indian Bamboo Products Market is driven by the growing popularity of these products as a substitute for tropical timber on account of their numerous benefits. Rural communities engage with bamboo handicrafts, textiles, artifacts, and household utilities. (NITI Aayog, n.d., 17)

Interventions under MPSBM

MPSBM and Bamboo Craft Development Board have been constituted to promote bamboo-based development and entrepreneurship leading to the creation of a sustainable bamboo economy. The society is functioning as the apex coordinating organization for the implementation of the activities of the National Bamboo Mission in Madhya Pradesh.

Objective: The vision of the Madhya Pradesh State Bamboo Mission is to promote and facilitate bamboo-based development in a holistically sustainable manner, to address multiple dimensions, including ecological, economic, social and cultural issues. The objective of the project is to develop a new line of sustainable bamboo products by bamboo artisans for national and international markets to promote and facilitate traditional and non-traditional bamboo-based artisans by developing their skills, increasing the supply of quality bamboo and availability of advanced tools and equipment for the artisans to make use of.

Action points under MPSBM

- Development of Fast Growing High Yielding (FYGHY) bamboo verities through tissue culture.
- Establishment of chain of bamboo nurseries in private and public sector.
- Rejuvenation of state bamboo forest
- Development of methodologies for best bamboo cultivation and harvesting practices.
- Encouragement of farmers to take up bamboo cultivation.
- Creating setup for primary processing units for bamboo treatment and storage for semi finished bamboo products.
- Development of bamboo base handicrafts as well as micro, small and medium size bamboo enterprises.
- Skill development of traditional bamboo artisans.
- Design and development of bamboo products using advance tools, equipments and machinery.
- Up-gradation of existing common facility centers (CFCs) across the state

Bambusetum

A national-level Bambusetum in Bhopal has been initiated to boost bamboo cultivation in the state under MPSBM. A park has been established having nearly 200 bamboo species planted under the pilot project.

Plantation of different bamboo species in Bambusetum

Training of Artisans under MPSBM

Capacity Building and Human Resource Development

One of the key action plans under MPSBM is the capacity building of existing bamboo stakeholders, including traditional and non-traditional producers and entrepreneurs. They are being trained by expert institutions, such as the National Institute of Design (NID), School of Planning and Architecture(SPA), Indian Plywood Industries Research& Training Institute(IPIRTI), etc., to build their skill in working with different bamboo applications and technologies. Under the MPSBM, 15 best artisans were sent to China to gain advanced training in the Bamboo application domain, community-level training programs have been established for architecture students and the competitions under district, regional and state level and ranking of artisans was facilitated.

Certification

- Office Certification with ISO 9001:2008
- FSC Certification of Balaghat Bamboo Forests
- Certification of Chain of custody and Bamboo products
- Certification is being carried out through MPCON Ltd

Bamboo Art & Craft School, Bhopal

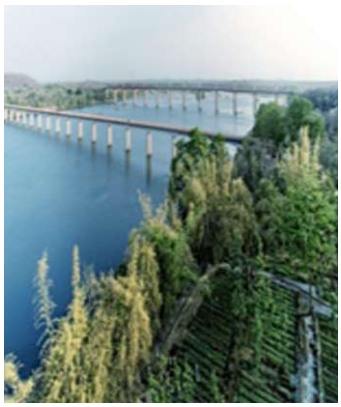
- The Bamboo Art & Craft School has been established in Bhopal to promote bamboo-based Entrepreneurship development in the state.
- Inclusion of Bamboo application and technology vocational courses in the curricular/ programs of Industrial training Institute and technical education has been implemented.

Bamboo chairs manufactured by local artisans

Online marketing of Bamboo products

The online marketing of the produced final bamboo products made by the local artisans through leading international e-commerce platforms such as Flipkart & eBay has been initiated to promote the livelihoods of these local artisans.

Project Highlights/ Impacts



Establishment of Hi-tech nurseries

Hi-tech bamboo nurseries established in Tikamgarh and Satna

Hi-tech nurseries of Tikamgarh & Satna in MP

Benefits

- Availability of High-Quality Bamboo Plants
- Availability of Various Species of Bamboo Plants
- Buy and Sell Bamboo Plants at Reasonable Prices
- Research on new Varieties of Bamboo

Bamboo Tunnel

A 10 km Bamboo tunnel has been established along Bhopal-Sehore road by planting bamboo on the roadside. Bamboo is a fast-growing plant and significantly contributes to carbon sequestration. MPSBM aimed to yield this ability of Bamboo to tackle the vehicular emissions by planting Bamboo on both sides of the road and establishing a Bamboo tunnel.

Public People Private Partnership

As a means to develop bamboo resources by combining the best attributes from public and private sources, a PPPP collaboration model has been established. Formal and organic collaborations have been developed between MPSBM and relevant institutions and individuals towards developing the bamboo sector in MP. This includes technical bodies, funding agencies, NGOs, expert consultants and resource persons, and government and intergovernmental institutions. (MPforest, n.d., 4)

Common facility centre (CFC) in Balaghat (source: MPSBM)

Common facility centers (CFCs)

Establishment of CFCs under the mission to provide an efficient work environment and facilities for the skilled-traditional and unskilled artisans to improve the productivity in the bamboo sector.

Benefits & facilities

- Easy Availability of raw materials for Bamboo Product Manufacturing.
- Availability of new tools or machinery and equipment for artisans to manufacture bamboo Products.
- Marketing facility of Bamboo products.
- Skill up-gradation training for new Bamboo Product Manufacturing

Social Impacts in Bamboo sector

For Growers

- Scientific Management Assistance in Bamboo Planting
- Grants gor Bamboo Plantation (as per the eligibility and budget)
- Selling Facility of Mature Bamboo

For Artisans

- A 9-week modular course in the six Study Center of M.P including Timarni, Rajaborari Study Center in the tribal belt off Harda district of M.P.
- A modular course in Bamboo Application Technology has been established
- Over 100 artisans were sponsored by MPSBM and they successfully completed the course during the 2014-15 session.
- 15 best artisans were sent to China to gain advanced training in the Bamboo application domain.
- Marketing of Bamboo Products
- Supply of Sale Facility for the Purchase of Raw Materials

For Traders

- Availability of Raw Materials and Bamboo Products
- Purchase and Sale Facility

For Manufacturers

- Availability and Purchase Facility of Bamboo Products
- Technical advise through Mission
- Sale Facility of Finished Products

Challenges in the Bamboo sector of India

Lack of policy and legal framework

Bamboo is governed by multiple policies of different ministries, with different legal definitions given in Indian Forest Act -192, National Forest Policy -1988 and Forest Right Act -2006. Hence a fixed policy and legal framework needs to be established to promote the bamboo sector in the country.

Convergence issues

At present eight central ministries (Agriculture,- National Bamboo & Agroforestry Mission, Forests - Green India Mission, Rural development - MNREGA plantation, Science & Technology - National Mission on Bamboo Application, MSME - Scheme of Fund for Regeneration of Traditional Industries, Commerce & Industry- Scheme for Design and Technology Up-gradation, Skill Development & Entrepreneurship, Pradhan Mantri Kaushal Vikas Yoina etc. have a direct or indirect impact on the development of Bamboo Sector.

Productivity issues

Productivity in the bamboo cultivation sector is critically low on both forests as well as private lands (2 tons per hectare) - Lack of quality seedlings, management tools and techniques, Processing units, post-harvest management & logistic management are causes of concern. There is a major gap that needs to be bridged in the manufacturing sector such as skilled manpower at various levels are lacking such as - Managers, Artisans etc.

Supply chain issues

A lot of impetus is being given to the "propagation and cultivation" of bamboo, meagre attention is directed towards the "processing and value chain addition" of bamboo products resulting in the lack of holistic development of the bamboo sector. Despite having the second-largest bamboo share, India's contribution to international trade is minuscule. In the existing value chain of bamboo, there is a lot of information asymmetry as the local communities are not aware of the demand in the market & cannot decide the price of their bamboo produce as they do not have much bargaining power in the value. (UNDP 2018).

Rural communities are facing a stiff challenge from other materials like plastic in daily use and brick masonry in construction for fencing, housing, and roofing. (Gawande, 2021)

Demand issues

There are several demand-side constraints in the Bamboo industry and there has been declining demand due to the drop in consumption and substitution of bamboo in the traditional market. (MoAFW, 2019, #) (Gawande, 2021)

In the paper industry, the consumption of bamboo declined substantially with the advancement in technology and changes in raw material composition. (Gawande, 2021)

Second, in the construction industry, the share of bamboo declined with the introduction of new-age materials like brick masonry, concrete, and steel. Third, with modernization and an increase in the overall standard of living, the use of bamboo has gradually declined in rural areas (Forest Department 2017). (Gawande, 2021)

Durability issues in Eco-friendly bamboo products

There are now alternatives made of bamboo available to phase out the use of plastic products. However, pure bamboo products are less durable and need to be replaced often. Other bamboo products are mixed with synthetic materials or processed with chemicals to increase their lifespan. To counteract this, product combinations of bamboo and other materials that do not negate the positives of bamboo are the need of the hour. (The Reality of Bamboo Products: Are They Sustainable? - Change Impacts, 2022)

Challenges addressed under MPSBM

MPSBM focused onlooking at the entire bamboo eco-system— the resource, producers, marketers, buyers, business development resource persons, and even flora and fauna deeply dependent on bamboo forests and is working in a PPP model functioning in a balanced way while keeping a synergy among different stakeholders for bamboo-based development to flourish in a sustainable and holistic manner in MP. The mission emphasized the need to increase the cultivation of quality Bamboo in the state and successfully acquired the certifications such as MP Office Certification with ISO 9001:2008, FSC Certification of Balaghat Bamboo Forests Certification of Chain of custody and Bamboo products through MPCON Ltd to strengthen the roots of bamboo sector in MP. The mission established special schools and courses for capacity building of the local artisans and manufacturers, established an ecosystem with the help of Common Facility Centres (CFCs) to provide them quality bamboo and advanced tools to manufacture finished bamboo products and also helped them to sell their products through e-commerce platforms.

MPSBM organized a Bamboo fair in Indore and a Bamboo mart in Bhopal to provide an opportunity to local artisans to exhibit their products on a national level and established an interaction among the entrepreneurs regarding the new technologies for the development of the bamboo sector.

Opportunities of Replicability

The other states with optimum bamboo resources have potential in the development of bamboo in the social, commercial and economical contexts & with the adoption of end to end solutions in the bamboo sector a complete value chain approach starting from bamboo growers to consumers can be established. The PPP model under the MPSBM is an example of different stakeholders coming together to achieve an efficient system in yielding results by overcoming the challenges. The emphasis on the capacity building of the officials, field functionaries, entrepreneurs and farmers through skill development and training could help in tackling the roots of the problem in the Indian Bamboo sector and also contribute towards addressing multiple dimensions including ecological, economic, social and cultural issues.

Way forward

India is the second-largest producer of Bamboo and the targets achieved under the MPSBM are a great example highlighting that the optimum policy framework and a strong synergy between the producer and the consumer can help in making bamboo a familiar and sustainable part of our lives. It has the potential to harness the rising concerns of climate change and help in achieving the nations' net-zero target efficiently. The policy may be structured such that the bamboo-based economy has more freedom to build external markets, which is needed to benefit from the plans to enhance production through increased productivity.

There is a need to educate people about the benefits of adopting bamboo in our lives and to debunk the existing myths and mind-sets about bamboo- often seen as a poor man's timber. The environmental and socio-economic aspects, whether in rural, semi-urban or urban markets, all are important. The entire bamboo system is surviving, and it is generating a lot of employment due to a strong rural market. In several states, bamboo is an integral part of lives at home, in agriculture systems, and for construction/housing work etc.

A strong connection and effective communication need to be established to inject this sustainable idea into the mind-set of urban society. These are different segments, and they need different approaches and strategies, to establish bamboo as a game-changer in the sustainable development and climate change domain.

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